

SJBC Curriculum

um Termly Plan: Y10 Science

Term	Topic(s) and links to other subjects	Core Knowledge	Core Vocabulary	Assessment	Resources
Autumn1	<p>Biology B5-B6. Infection and Response</p> <p>B3. Organisation and the Digestive System</p> <p>(Some basic immune system references and links to health and disease)</p> <p>B7: Non-communicable Diseases</p> <p>(For contrast with communicable diseases, and extended understanding of disease and prevention)</p> <p>B8: Photosynthesis</p> <p>(Links to TMV and how disease impacts plant function)</p>	<p>Biology B5. Communicable disease</p> <ul style="list-style-type: none"> • Pathogens (bacteria, viruses, fungi, and protists) cause communicable diseases and can spread through air, water, direct contact, or vectors. • Viruses live and reproduce inside cells, often causing cell damage; examples include measles, HIV, and tobacco mosaic virus (TMV). • Bacterial diseases like salmonella and gonorrhoea produce toxins and are treated with antibiotics. • Fungal and protist diseases include rose black spot and malaria; these have unique transmission methods and treatments. • The body’s defence systems include skin, mucus, stomach acid, and immune responses from white blood cells (phagocytosis, antibodies, antitoxins). • Vaccinations help prevent disease by preparing the immune system to respond quickly to future infections. • The spread of disease can be reduced through hygiene, isolation, vaccination, and controlling vectors. 	<p>Biology: B13. Reproduction</p> <p>Pathogen Virus Bacteria Fungi Protist Infectious Communicable Transmission Vector Immune system White blood cell Antibody Antigen Antitoxin Phagocytosis Vaccination Immunisation Antibiotic Antibiotic resistance Mutation Salmonella Gonorrhoea Measles HIV Tobacco mosaic virus (TMV) Rose black spot Malaria Hygiene Isolation Immunity</p>	<p>End of topic test consisting of a mix of short and long answers (30- 45 mins)</p> <p>PPE1</p>	<p>Core resources: My GCSE Science</p> <p>Enrichment and extension resources:</p>

	<p>B9: Respiration</p> <p>(Indirect links to how pathogens may affect energy release in cells)</p> <p><u>Links to other subjects</u></p> <p>Geography Global health, disease spread, climate impact Malaria, water-borne disease, sanitation, vectors in different climates</p> <p><u>Chemistry</u> C4. Chemical Calculation</p> <p>Links to other units</p> <p>Unit 1: Atomic Structure and the Periodic Table</p>	<p><u>B6. Preventing and treating disease</u></p> <ul style="list-style-type: none"> • Vaccination introduces small amounts of dead or inactive pathogens to stimulate the immune system to produce antibodies and memory cells. • Antibiotics kill bacteria but don't work on viruses; overuse or misuse can lead to antibiotic resistance. • Painkillers relieve symptoms but don't kill pathogens or cure infections. • New drugs are developed through preclinical testing on cells, tissues, and animals, followed by clinical trials on human volunteers. • In double-blind trials, neither the patient nor the doctor knows who receives the real drug or placebo, this avoids bias. • Monoclonal antibodies are identical copies of one type of antibody, used in pregnancy tests, cancer treatments, and locating specific substances in the body. • Plants can suffer from diseases and mineral deficiencies; they show symptoms like discolouration, stunted growth, or spots, and have physical, chemical, and mechanical defences. <p><u>Chemistry</u></p>	<p><u>B6. Preventing and treating disease</u></p> <p>Vaccine Vaccination (more detailed use in B6, including development and mechanisms) Immunity Placebo Double-blind trial Clinical trial Preclinical testing Toxicity Dosage Monoclonal antibodies Pregnancy test Cancer therapy Hybridoma cell Specificity Mineral deficiency Nitrate Magnesium Physical defence Chemical defence Mechanical defence Chlorosis Plant diseases Detection Diagnosis</p>		<p>Core resources:</p> <p>My GCSE Science</p> <p>Enrichment and extension resources:</p>
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	<p>Unit 5: Chemical Changes</p> <p>Unit 10: Using Resources</p> <p>Links to other subjects</p> <p>Maths</p> <p>Ratio and proportion – used to interpret and apply mole ratios from balanced equations.</p> <p>Rearranging formulas – needed for calculations such as mass = moles</p> <p>Physics P4. Electric circuits Link to other Physics Units</p> <p>P2: Energy – Links through electrical work, energy transfers in circuits, and calculations using power and energy formulas.</p>	<p>C4. Chemical Calculations</p> <ul style="list-style-type: none"> Relative atomic mass (Ar) and relative formula mass (Mr) are calculated using atomic masses from the periodic table. The mole is the unit used to count particles; 1 mole of a substance has a mass equal to its Mr in grams. Use the formula mass = moles × Mr to calculate the mass, moles, or formula mass in a chemical reaction. Balanced chemical equations show the ratio of moles between reactants and products. Limiting reactants are used up first in a reaction and determine how much product is made. Percentage yield and atom economy help assess how efficient a chemical reaction is and reduce waste in industrial processes. <p>Physics P4. Electric circuits</p>	<p>Physics P10. Forces and Motion Scalar / Vector Speed / Velocity Acceleration</p> <p>C4. Chemical Calculation Relative Atomic Mass (Ar) Isotope Mass Number Atomic Number Abundance Relative Formula Mass (Mr) Mole Avogadro’s Constant Empirical Formula Molecular Formula Percentage Composition Balanced Equation Limiting Reactant Excess Reactant Mass Concentration</p>		<p>Core resources:</p> <p>My GCSE Science</p> <p>Enrichment and extension resources:</p>
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	<p>Unit P5: Electricity in the Home Builds on circuit knowledge with alternating current (AC), mains electricity, power ratings, and electrical safety.</p> <p>Links to other subject (D&T) – KS4</p> <p>Students apply knowledge of current, voltage, and resistance when designing and building electronic products.</p>	<ul style="list-style-type: none"> • Electric current is the flow of charge through a circuit, measured in amperes (A), and is the same at all points in a series circuit. • Potential difference (voltage) is the energy transferred per unit charge, measured in volts (V), and drives the current around a circuit. • Resistance opposes the flow of current; it is measured in ohms (Ω) and calculated using $V = IR$ (voltage = current \times resistance). • In series circuits, current is the same everywhere, but voltage is shared between components. • In parallel circuits, voltage is the same across each branch, but current splits between branches depending on resistance. • Components like resistors, lamps, diodes, and thermistors behave differently with changes in current, temperature, or direction of flow. • Required practicals include investigating how changing the length of a wire or using different components affects resistance and current. 	<p><u>P4. Electric circuits</u></p> <p>Current Charge Potential Difference Voltage Resistance Series Circuit Parallel Circuit Ohm (Ω) Ampere (A) Volt (V) Resistor Lamp (Bulb) Diode Thermistor LDR (Light Dependent Resistor) Power Supply Circuit Diagram Ohm's Law $V = IR$ Required Practical</p>		
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<p>Autumn 2</p>	<p>Biology B.7 Non communicable disease</p> <p>Links to science: Unit: B1 – Cell Structure and Transport</p> <p>-Links to understanding uncontrolled cell division in cancer</p> <p>Unit: B5-B6 – Infection and Response</p> <p>Links Contrast with communicable diseases and how risk factors differ</p> <p>Links to other subjects</p> <p>PE</p> <p>Topic Exercise and fitness</p> <p>Links Understanding cardiovascular health and obesity prevention</p>	<p><u>B7. Non communicable disease</u></p> <ul style="list-style-type: none"> • Non-communicable diseases (e.g. cancer, diabetes, cardiovascular disease) are not caused by pathogens and cannot be spread between people. • Lifestyle factors like diet, alcohol, smoking, and lack of exercise increase the risk of developing these diseases. • Smoking is linked to lung disease, cardiovascular problems, and low birth weight in babies. • Alcohol consumption can damage the liver and brain and harm unborn babies during pregnancy. • Diet and obesity influence the risk of developing Type 2 diabetes and heart disease. • Cancer occurs when cells grow and divide uncontrollably; risk factors include smoking, radiation, infections, and genetic links. • These diseases have a global and economic impact, affecting health systems, families, and national productivity. 	<p><u>B7. Non communicable disease</u></p> <p>Non-communicable Disease Lifestyle Factor Cardiovascular Disease Type 2 Diabetes Obesity Carcinogen Risk Factor Morbidity Mortality Incidence</p>	<p>End of topic test (30 mins) PPE1</p> <p>End of topic test consisting of a mix of short and long answers (30- 45 mins)</p>	<p>Core resources:</p> <p>Enrichment and extension resources:</p>
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	<p>B8. Photosynthesis</p> <p>Link other to science</p> <p>Unit: B2 – Organisation</p> <p>Link: Chloroplasts in plant cells and their role</p> <p>Unit C2 – Bonding & Structure</p> <p>Link: Carbohydrates like glucose and starch</p> <p>Links to other subject</p> <p>Subjects: Environmental Science</p> <p>Impact of limiting factors and greenhouses on crop yields</p> <p>Chemistry</p>	<p><u>B8. Photosynthesis</u></p> <ul style="list-style-type: none"> • Photosynthesis is how plants make glucose using carbon dioxide, water, and sunlight in their chloroplasts. • The word equation is: carbon dioxide + water → glucose + oxygen. • Glucose is used for respiration, stored as starch, or turned into cellulose, fats, and proteins. • Photosynthesis rate is affected by light intensity, carbon dioxide, temperature, and chlorophyll levels. • These are called limiting factors. If one is too low, it slows the process • Greenhouses use controlled conditions to maximise photosynthesis and improve crop growth. <p><u>C5. Chemical Changes</u></p>	<p><u>B8. Photosynthesis</u></p> <p>Photosynthesis Chloroplast Chlorophyll Glucose Starch Limiting Factor Light Intensity Carbon Dioxide Concentration Temperature Oxygen</p>	<p>End of topic test (30 mins) PPE1</p>	
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	<p>C5. Chemical Changes</p> <p>Links to other Chemistry units</p> <p>1. Unit C2: Bonding, Structure, and the Properties of Matter – Links through understanding how ions form, the nature of ionic compounds, and why electrolysis works on molten or aqueous ionic substances.</p> <p>Links to other Subjects</p> <p>In environmental geography and resource management, students learn about metal extraction and its environmental impact.</p> <p>Physics</p>	<ul style="list-style-type: none"> • Acids react with metals, metal oxides, metal hydroxides, and metal carbonates to form salts; these are called neutralisation reactions. • The pH scale measures acidity and alkalinity; indicators and pH probes can be used to measure it accurately. • Acids in solution release hydrogen ions (H⁺), while alkalis release hydroxide ions (OH⁻). • A strong acid fully ionises in water; a weak acid only partially ionises. • Reactivity series shows how reactive metals are; it helps predict reactions with water or acid and is used to determine how metals are extracted. • Electrolysis is used to extract reactive metals and to split ionic compounds using electricity; it involves oxidation at the anode and reduction at the cathode. <p>P5. Electricity in the home</p>	<p>C5. Chemical Changes</p> <p>Acid Alkali Base Neutralisation Salt pH scale Indicator Reactivity series Displacement reaction Electrolysis</p>	<p>End of topic test consisting of a mix of short and long answers (30- 45 mins)</p>	<p>Core resources:</p> <p>My GCSE Science</p> <p>Enrichment and extension resources:</p>
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	<p>P5. Electricity in the home</p> <p>Link to other physics unit . P2: Energy – Links through energy transfers in electrical appliances, calculating efficiency, energy transferred ($E = Pt$), and comparing energy use in everyday contexts.</p> <p>Link to other Subject: Design and Technology (D&T) - Understanding of fuses, circuit breakers, and power ratings is essential for designing safe and energy-efficient systems.</p>	<p>Mains electricity in the UK is an a.c. (alternating current) supply at about 230 V and 50 Hz; battery supply is d.c. (direct current).</p> <p>Three-pin plugs contain live (brown), neutral (blue), and earth (green/yellow) wires, each with specific functions for safety.</p> <p>The live wire carries current from the power supply; the neutral wire completes the circuit; the earth wire prevents electric shocks.</p> <p>Fuses and circuit breakers protect appliances by breaking the circuit if the current is too high.</p> <p>Power (P) in an electrical appliance is calculated using $P = IV$ (power = current \times voltage) or $P = I^2R$.</p> <p>Energy transferred is calculated using $E = Pt$ or $E = QV$, and is measured in joules or kilowatt-hours (kWh).</p> <p>Understanding efficiency and reducing energy waste is essential when comparing household devices and their energy ratings.</p>	<p><u>5. Electricity in the home</u></p> <p>Alternating Current (AC) Direct Current (DC) Mains Electricity Live Wire Neutral Wire Earth Wire Fuse Circuit Breaker Power (Watt) Energy Transfer</p>		
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<p>Spring 1</p>	<p>Biology B9. Respiration</p> <p>Unit P2 – Energy</p> <p>Links through the concept of energy transfers and stores. Respiration is an exothermic process that releases energy, which connects to how energy is stored in chemical stores and transferred during physical activity.</p> <p>External Subject Link: Physical Education (PE) – KS4</p> <p>Links through understanding how the body uses energy during exercise. Topics like aerobic and anaerobic respiration, oxygen debt, and recover</p> <p>Chemistry C6. Electrolysis</p> <p>Links to science: C2 – Bonding, Structure & Properties Link:</p>	<p>B9. Respiration</p> <ul style="list-style-type: none"> • Respiration is an exothermic reaction that releases energy from glucose, used for muscle contraction, maintaining body temperature, and active transport. • Aerobic respiration requires oxygen and occurs in all cells: • glucose + oxygen → carbon dioxide + water (+ energy) • Anaerobic respiration occurs without oxygen, producing less energy: • In muscles: glucose → lactic acid • Anaerobic respiration in yeast (fermentation) produces ethanol and carbon dioxide and is used in brewing and baking. • Lactic acid buildup during exercise leads to oxygen debt, which must be repaid by continued breathing after activity ends. • The energy demand during exercise increases breathing rate, heart rate, and blood flow to muscles. • The body responds to exercise by increasing respiration rate to supply muscles with more oxygen and glucose. <p>C6. Electrolysis</p> <ul style="list-style-type: none"> • Electrolysis uses electricity to split ionic compounds into their elements when molten or in solution. • It requires a direct current (d.c.) power supply, with positive ions moving to the cathode (negative electrode) and negative ions to the anode (positive electrode). 	<p>B9. Respiration</p> <p>Respiration Aerobic Respiration Anaerobic Respiration Glucose Oxygen Lactic Acid Mitochondria Energy (ATP) Oxygen Debt Metabolism</p>		
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<p>Understanding ionic lattice, why compounds conduct when molten/aqueous</p> <p>Unit C4 – Chemical Changes</p> <p>Links Oxidation and reduction processes</p> <p>Link other subject</p> <p>Subject Environmental Science</p> <p>Topic: Metal extraction impacts</p> <p>Links: Sustainability and environmental effects of mining and metal extraction</p> <p>Physics P7. Atomic structure-radioactivity</p> <p>Links to science</p> <p>Units P6 – Molecules and Matter</p>	<p>• Reduction happens at the cathode (gain of electrons), and oxidation happens at the anode (loss of electrons).</p> <p>• In the electrolysis of molten compounds, elements are produced directly at each electrode.</p> <p>• In aqueous solutions, water also ionises, so the products at the electrodes depend on the reactivity of the ions present.</p> <p>• Electrolysis is used to extract reactive metals (e.g. aluminium) from molten ores, especially those too reactive to be extracted by carbon.</p> <p>• Electrolysis of brine (sodium chloride solution) produces chlorine gas, hydrogen gas, and sodium hydroxide, all important in industry.</p> <p><u>P7. Atomic structure-Radioactivity</u></p> <p>• Atoms consist of a nucleus (protons and neutrons) surrounded by electrons in shells; most of the atom's mass is in the nucleus.</p> <p>• The number of protons = electrons in a neutral atom; atomic number = protons, mass number = protons + neutrons.</p> <p>• Isotopes are atoms of the same element with different numbers of neutrons.</p>	<p><u>C6. Electrolysis</u></p> <p>Electrolysis Electrolyte Electrode Anode Cathode Ionic Compound Molten Ion Oxidation Reduction</p>			
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	<p>Link: Understanding atoms, energy changes during phase changes</p> <p>Links to other subject</p> <p>Subject: History of Science Topic: Scientific models</p> <p>Links: Development of atomic models through time</p>	<ul style="list-style-type: none"> • Some isotopes are radioactive and emit nuclear radiation as they decay: alpha, beta, and gamma. • Alpha particles are large and least penetrating; beta particles are more penetrating; gamma rays are highly penetrating but weakly ionising. • Nuclear radiation is measured in Becquerels (Bq) and can be detected with a Geiger counter. • Radioactive decay is random; half-life is the time taken for the radioactivity of a substance to halve. 	<p><u>P7. Atomic structure-Radioactivity</u></p> <p>Atom Nucleus Proton Neutron Electron Isotope Radioactive Decay Alpha Particle Beta Particle Gamma Ray</p>		
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<p>Spring 2</p>	<p>Biology B10. Human nervous system</p> <p>Links to science Unit: B2 – Cell Division Links: Neurons are specialised to transmit signals</p> <p>Unit: B7 – Non-Communicable Diseases</p> <p>Links: Understanding neurological damage as part of disease impact</p> <p>Links to other subject Computer Science</p> <p>Topic Input/output systems</p> <p>Links Comparison to digital signal processing and machine responses</p> <p>Maths</p> <p>Topic: Data analysis</p>	<p>B10. Human nervous system</p> <ul style="list-style-type: none"> • The nervous system allows the body to detect and respond to stimuli using receptors, sensory neurons, the brain/spinal cord (CNS), and effectors. • A reflex arc is a fast, automatic response that bypasses conscious brain involvement — it includes sensory, relay, and motor neurons. • Effectors are muscles or glands that carry out a response to a stimulus (e.g. contracting or secreting hormones). • Synapses are gaps between neurons where signals are transmitted chemically using neurotransmitters. • The brain controls complex behaviours and contains areas responsible for different functions such as memory, coordination, and senses. • Scientists study the brain using MRI scans, electrical stimulation, and case studies of brain damage. • The eye is a sense organ that focuses light onto the retina; it adjusts to light using the iris and focuses using the lens and ciliary muscles. <p>C7. Energy changes</p> <ul style="list-style-type: none"> • Energy changes occur in all chemical reactions and can be either exothermic (release energy) or endothermic (absorb energy). • Exothermic reactions include combustion and many oxidation reactions; they cause a temperature increase in the surroundings. • Endothermic reactions include thermal decomposition and some neutralisations; they result in a temperature drop. • Reaction profiles show the energy changes during a reaction and include activation energy and energy difference between reactants and products. 	<p>B10. Human nervous system Neuron Synapse Neurotransmitter Reflex Arc Sensory Neuron Motor Neuron Central Nervous System (CNS) Effector Stimulus Receptor</p> <p>C7. Energy changes Exothermic Endothermic Activation Energy Reaction Profile Bond Energy Energy Transfer Combustion Thermal Decomposition Neutralisation Temperature Change</p>		
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	<p>Links: Used in required practicals (reaction time averages, interpreting data)</p> <p>Chemistry C7. Energy changes</p> <p>Links in Science C5 – Chemical Changes</p> <p>Links: These reactions are often exothermic and link to practical measurement of temperature change</p> <p>C8– Rate and Extent of Chemical Change</p> <p>Links: Energy changes affect rate of reaction (activation energy and catalyst usage)</p>	<ul style="list-style-type: none"> • Bond breaking is endothermic and bond making is exothermic — the overall energy change depends on the balance of these. • The energy change in a reaction can be calculated using bond energies from the reactants and products. • Required practical: students investigate temperature changes in reactions (e.g. neutralisation) and measure energy transfer using a thermometer and polystyrene cup. <p>C8. Rate of chemical reaction</p> <ul style="list-style-type: none"> • A pure substance contains only one element or compound; mixtures have variable compositions and melt/boil over a range of temperatures. • Formulations are carefully designed mixtures (e.g. paints, medicines) made for a specific purpose, containing components in precise amounts. 			
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	<p>Links to other subjects</p> <p>Geography</p> <p>Topic: Combustion and energy resources</p> <p>Links: Combustion and energy resources</p> <p>Math:</p> <p>Topic: Calculations, averages, algebra</p> <p>Links: Used in bond energy calculations and interpreting reaction profiles</p> <p>C8. Rate of reaction Links in other science</p> <p>Unit: C1 – Atomic Structure and the Periodic Table</p> <p>Link: Lays foundational</p>	<p>P8. Forces in balance</p>	<p>C8. Rate of chemical reaction</p> <p>Rate of Reaction</p> <p>Catalyst</p> <p>Collision Theory</p> <p>Activation Energy</p> <p>Surface Area</p> <p>Concentration</p> <p>Temperature</p> <p>Pressure</p> <p>Reversible Reaction</p> <p>Equilibrium</p>		
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	<p>understanding of pure vs. mixed substances</p> <p>KS4 Biology Topic: Enzymes, DNA, plant pigments Link: Chromatography appears in practical enzyme/pigment separation</p> <p>Physics P8. Forces in balance</p> <p>Links In science:</p> <p>Unit. P1 – Energy Reinforces Work = Force × Distance as energy is transferred via forces</p> <p>Unit. P9 – Motion Builds on understanding how forces change speed/direction</p>	<ul style="list-style-type: none"> • A force is a push or pull acting on an object due to interaction; it can change an object’s shape, speed, or direction. • Contact forces (e.g. friction, air resistance) and non-contact forces (e.g. gravity, magnetic, electrostatic) act in different ways. • Weight = mass × gravitational field strength ($W = mg$); weight is measured in newtons using a calibrated spring balance. • Resultant force is the single force that has the same effect as all the forces acting on an object combined. • Work done = force × distance ($W = Fd$); work transfers energy and is measured in joules. • Elastic objects follow Hooke’s Law up to the limit of proportionality: force = spring constant × extension ($F = kx$). • Required practical: students investigate the relationship between force and extension using a spring and measure whether Hooke’s Law applies. 	<p>P8. Forces in balance Force Mass Weight Resultant Force Contact Force Non-contact Force Friction Newton (N)</p>		
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	<p>Unit. P10 – Force and Motion Uses resultant force in $F = ma$; links to force diagrams</p> <p>Geography</p> <p>Topic: Natural forces, gravity, erosion</p> <p>Links: Forces in Earth systems — gravity, friction, etc., play roles in shaping landscapes</p>		Hooke's Law Extension		
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<p>Summer 1</p>	<p>Biology</p> <p>Links in science</p> <p>Unit C2 – Structure and Bonding</p> <p>Link: Explains why metal ions form characteristic colours/precipitates</p> <p>KS4 Physics: Topic: Emission spectra (in Atomic Structure)</p> <p>Link Flame colours explained using electron energy levels (linked to photons)</p> <p>Links to other subject</p> <p>Engineering & D&T Topic: Materials testing, quality control</p> <p>Links: Analytical methods applied in industry for material testing</p>	<p>B11: Hormonal Coordination</p> <ul style="list-style-type: none"> • The endocrine system is made up of glands that release hormones into the blood to control body processes. • Hormones are chemical messengers that travel in the blood to target organs, acting more slowly but for longer than nerves. • The pituitary gland is the master gland, releasing hormones that regulate other glands and control growth, water balance, and reproduction. • Blood glucose regulation involves insulin (lowers glucose levels) and glucagon (raises glucose levels), both released by the pancreas. • Type 1 diabetes is treated with insulin injections; Type 2 is managed through diet, exercise, and sometimes medication. • Hormones control the menstrual cycle — including FSH, LH, oestrogen, and progesterone — which regulate ovulation and uterine lining changes. • Contraceptive methods include hormonal (e.g. pill, patch) and non-hormonal (e.g. condoms, IUDs); fertility treatments like IVF use artificial FSH and LH. 	<p>B11: Hormonal Coordination</p> <p>Hormone Endocrine Gland Insulin Glucagon Homeostasis Menstrual Cycle Ovulation Contraception Diabetes Negative Feedback</p>		
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	<p>Chemistry C8. Rate of chemical reaction</p> <p>Links other science: Unit C2 – Structure and Bonding Understanding why metal ions behave differently in flame/precipitate tests</p> <p>Unit C5 – Chemical Changes</p> <p>Link: Supports understanding of ionic reactions and gas formation</p> <p>Link to other subject</p> <p>Physics</p> <p>Topic: Light and flame colours (emission spectra)</p> <p>Link: Flame tests link to electron excitation and emission spectra,</p>	<p>C8. Rate of chemical reaction</p> <ul style="list-style-type: none"> Chromatography separates mixtures and helps identify substances; substances travel different distances depending on solubility and attraction to the paper. The Rf value (distance moved by substance ÷ distance moved by solvent) helps identify components in mixtures. Tests for gases include: <ul style="list-style-type: none"> Hydrogen: squeaky pop with lit splint Oxygen: relights glowing splint Carbon dioxide: turns limewater cloudy Chlorine: bleaches damp litmus paper white Flame tests identify metal ions by colour: e.g. lithium (crimson), sodium (yellow), potassium (lilac), calcium (orange-red), copper (green). Sodium hydroxide tests form coloured precipitates with some metal ions; further tests detect halides and carbonates. 	<p>C8. Rate of chemical reaction</p> <p>Rate of Reaction Catalyst Collision Theory Activation Energy Surface Area Concentration Temperature Pressure Reversible Reaction Dynamic Equilibrium</p>		
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	<p>developed further in atomic physics</p> <p>C9. Crude Oil and Fuels</p> <p>Unit. C1 – Atomic Structure Links: Understanding that hydrocarbons are made of hydrogen and carbon atoms</p> <p>Unit C8 – Chemical Analysis</p> <p>Links: Supports combustion testing and identification of combustion products</p> <p>Citizenship / PSHE Topic: Environmental ethics, global responsibility</p> <p>Links: Fossil fuel consumption and</p>	<p>C9. Crude Oil and Fuels</p> <ul style="list-style-type: none"> • Crude oil is a finite resource found in rocks; it's a mixture of hydrocarbons formed from ancient biomass. • Hydrocarbons are molecules made of hydrogen and carbon, most are alkanes, which are saturated and follow the general formula C_nH_{2n+2}. • Crude oil is separated by fractional distillation, where different fractions are collected based on their boiling points. • The properties of hydrocarbons (e.g. viscosity, flammability, boiling point) depend on chain length, shorter chains are more useful as fuels. • Combustion of hydrocarbons in oxygen releases energy, producing carbon dioxide and water; incomplete combustion also produces carbon monoxide and soot. • Cracking breaks long-chain hydrocarbons into shorter alkanes and alkenes; this is done thermally or catalytically to meet fuel demand. • Alkenes are unsaturated hydrocarbons with a double bond, more reactive than alkanes, and useful for making polymers. 	<p>C9. Crude Oil and Fuels Crude Oil Hydrocarbon Alkane Alkene Fractional Distillation Viscosity Flammability Combustion Cracking Saturated</p>		
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climate ethics
discussions

Required practical: students investigate the relationship between force and extension using a spring and measure whether Hooke's Law applies.

SJBC Curriculum Termly Plan: Y11 Science

Term	Topic(s) and links to other subjects	Core Knowledge	Core Vocabulary	Assessment	Resources
Autumn 1	<p><u>Biology</u> B13. Reproduction B14. Variation and Evolution</p> <p><u>Chemistry</u> C12. Chemical Analysis C13. The Early Atmosphere</p> <p><u>Physics</u> P10. Forces and Motion</p>	<p><u>Biology</u> <u>B13. Reproduction</u></p> <ul style="list-style-type: none"> Sexual and asexual reproduction in plants and animals. Meiosis: the process, importance in producing variation. Advantages and disadvantages of sexual and asexual reproduction. DNA structure: double helix, polymer of nucleotides, base pairing (A-T, C-G). Human genome project: applications and implications. Inheritance: dominant and recessive alleles, genotype vs phenotype. Genetic disorders: cystic fibrosis, polydactyly. Punnett squares and family trees. <p><u>B14. Variation and Evolution</u></p> <ul style="list-style-type: none"> Causes of variation: genetic, environmental, both. Evolution by natural selection (Darwin’s theory). Selective breeding (artificial selection). Genetic engineering: basic principles, applications. Cloning: methods (cuttings, embryo transplants, adult cell cloning). Benefits and risks of genetic technologies. Theories of evolution: Darwin, Lamarck. Evidence for evolution: fossils, antibiotic resistance. Speciation and extinction. <p><u>Chemistry</u></p>	<p><u>Biology: B13. Reproduction</u></p> <p>Meiosis Mitosis Gametes Zygote Chromosomes Allele Dominant / Recessive Genotype / Phenotype Homozygous / Heterozygous Inherited disorder Carrier DNA / Gene / Genome Base pairs</p> <p><u>B14. Variation and Evolution</u></p> <p>Variation Mutation Natural selection Evolution Selective breeding Genetic engineering Cloning Embryo transplant Adult cell cloning Speciation Fossil Extinction</p>	<p>End of topic test (45 mins) PPE1</p>	<p>Core resources: My GCSE Science Enrichment and extension resources:</p>

		<p><u>C12. Chemical Analysis</u></p> <ul style="list-style-type: none"> • Pure substances vs mixtures. • Formulations: mixtures with a specific purpose. • Chromatography: Rf values, identifying substances. • Test for gases: hydrogen, oxygen, carbon dioxide, chlorine. • Flame tests: identifying metal ions. • Tests for anions: carbonates, halides, sulfates. • Precipitation tests for metal ions. <p><u>C13. The Earth's Early Atmosphere</u></p> <ul style="list-style-type: none"> • Earth's early atmosphere: volcanic activity, composition (CO₂, N₂, water vapour). • Formation of oceans and removal of CO₂. • Development of oxygen: photosynthesis by algae/plants. • Current atmosphere composition: ~78% N₂, 21% O₂, small CO₂. • Effects of photosynthesis on CO₂ and O₂ levels. • Carbon capture and storage, fossil fuels and greenhouse gases. <p><u>Physics</u> <u>P10. Forces and Motion</u></p> <ul style="list-style-type: none"> • Scalars and vectors: speed is scalar, velocity is vector. • Distance–time and velocity–time graphs: calculating speed, acceleration. • Acceleration: change in velocity / time. • Newton's laws of motion: <ul style="list-style-type: none"> - First: object stays at rest or in motion unless acted on. - Second: $F = ma$. - Third: equal and opposite reaction forces. • Stopping distance = thinking + braking distance. 	<p><u>Chemistry</u> <u>C12. Chemical Analysis</u></p> <p>Pure substance Mixture Formulation Chromatography Rf value Flame test Precipitate Ion tests Halide Sulfate / Carbonate Anion / Cation</p> <p><u>C13. The Earth's Early Atmosphere</u></p> <p>Atmosphere Volcanic activity Greenhouse gases Photosynthesis Algae Atmosphere Carbon dioxide Oxygen Nitrogen Carbon capture Fossil fuels</p> <p><u>Physics</u> <u>P10. Forces and Motion</u></p> <p>Scalar / Vector Speed / Velocity Acceleration Distance–time graph Velocity–time graph Newton's Laws Resultant force Inertia</p>		
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Autumn 2	<p>Biology B15. Genetics and Evolution B16. Adaptations and Interdependence</p> <p>Chemistry C14. The Earth's Resources</p> <p>Physics P12. Wave properties P13. Electromagnetic Spectrum</p>			End of topic test (30 mins) PPE1	Core resources: Enrichment and extension resources: